# March 1, 2015 Water Supply Forecast Discussion

The Colorado Basin River Forecast Center (CBRFC) geographic forecast area includes the Upper Colorado River Basin, Lower Colorado River Basin, and Eastern Great Basin.

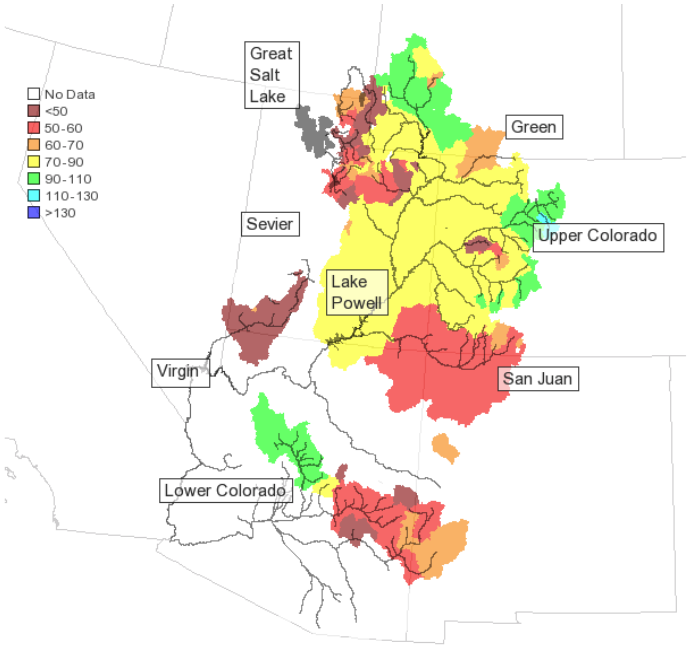
**Seasonal Water Supply Forecasts:**

**Quick Summary:**

Near to above average April-July runoff volumes are anticipated in the Colorado River Basin above Cameo, parts of the Green River Basin above Fontenelle Reservoir, and in the southeast Gunnison River Basin. Elsewhere in the Upper Colorado River Basin and Great Basin, below or much below average runoff volumes are expected. The lowest runoff volumes with respect to average are anticipated in the Great Basin, Duchesne River Basin in northeast Utah, Virgin River of southwest Utah, and San Juan River Basin of southwest Colorado.

When comparing early March forecasts to those issued in February there were some small increases in forecast volumes in the Colorado River headwaters, San Juan, and Dolores Basins, while forecasts decreased at most other locations. The largest decreases occurred in the Great Basin, Duchesne River Basin, and several lower elevation basins in Colorado .

In the Lower Colorado River Basin, March-May volumes are forecast near to above median in the Verde River Basin, below median in the Salt River Basin, and much below median in the Gila River Basin and Little Colorado River Basin. There was a general lack of snow in the Lower Colorado River Basin this winter, however January rainfall in the Gila River Basin and recent rainfall in the Verde River Basin helped push the full period January-May volumes to near or above median.



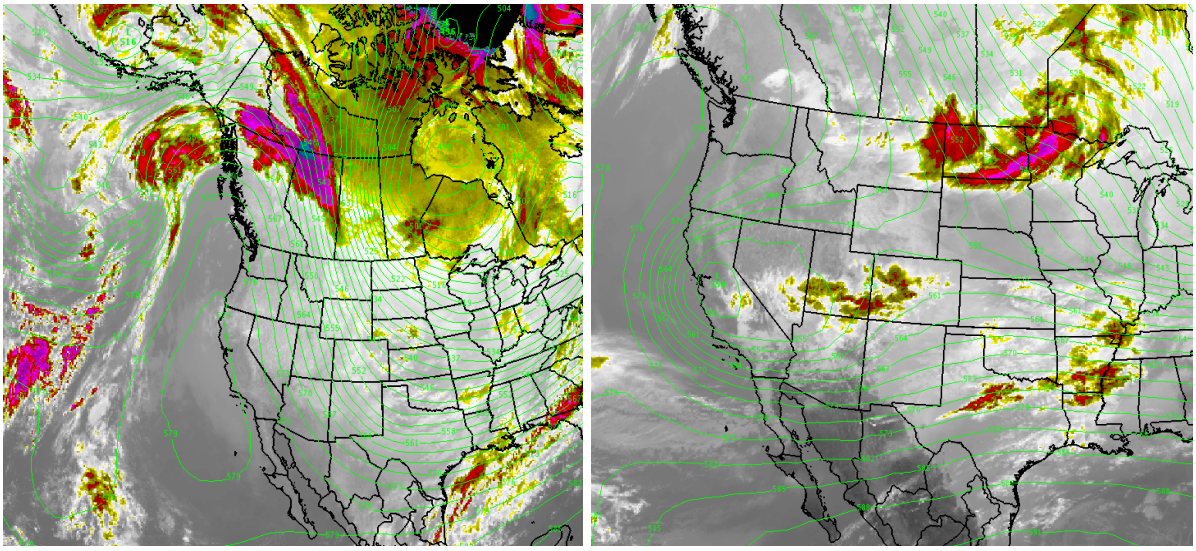

Upper Colorado Basin: April-July runoff volumes as a percent of 1981-2010 average
Lower Colorado Basin (Arizona): February-May volumes as a percent of 1981-2010 median

[Click here for specific site water supply forecasts]

## Water Supply Discussion

**Weather Synopsis:**

Most of February was dominated by warm and dry weather due to a strong ridge of high pressure that directed storms to the north and east of the CBRFC forecast area. As a result, precipitation was generally much below average, several daily maximum temperature records were established, and snow melt occured at elevations up to 9000 feet in some areas. A change occurred during the last week of the month as the persistent high pressure finally gave way to a more active weather pattern. A strong storm system developed along the west coast and drifted to the south bringing significant precipitation to the southern half of the CBRFC forecast area.

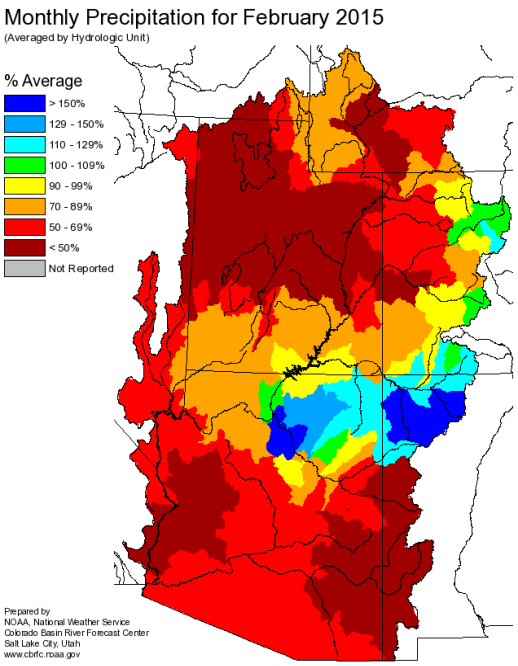


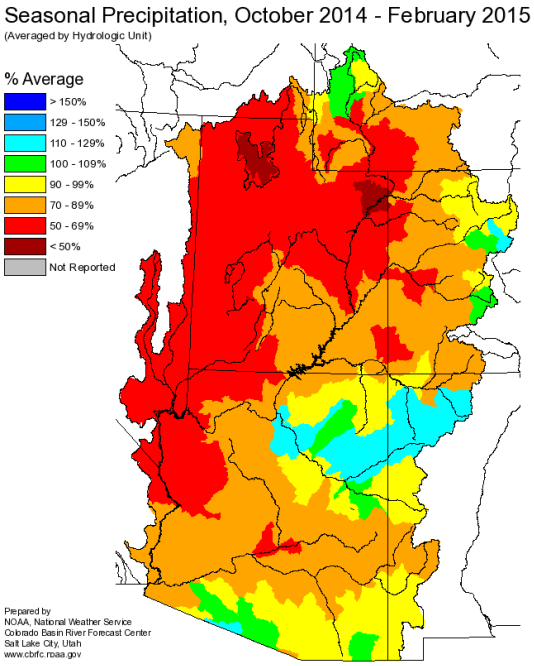
**Left Image:** A satellite image from Feb 17th shows a high pressure ridge and dry conditions that dominated most of the month. **Right Image:** A satellite image from Feb 23rd shows a low pressure system developing along the west coast. This system would swing through the area the last weekend of the month bringing significant precipitation to Arizona and southwest Colorado.

**Precipitation and Temperatures:**

Much below average precipitation was widespread throughout the Great Basin, Upper Colorado and Lower Colorado River Basins in February. There were a couple exceptions, however, due to the trajectory of storms around the ridge of high pressure and due to the storm system at the end of the month. The Upper Colorado River headwaters received near to above average precipitation as storm systems dropped south along the east side of the high pressure ridge. Pockets of near to above average precipitation were also noted in the eastern San Juan River Basin, southeast Gunnison River Basin, and Little Colorado River Basin of northern Arizona due to the storm system at the end of the month that carried into early March.

Seasonal October through February precipitation is below to much below average over most of the CBRFC forecast area. Only the Little Colorado River Basin, a few isolated areas in the Upper Colorado River headwaters, and Green River Basin headwaters above Fontenelle Reservoir have received near to above average seasonal precipitation.




Monthly and seasonal precipitation graphics

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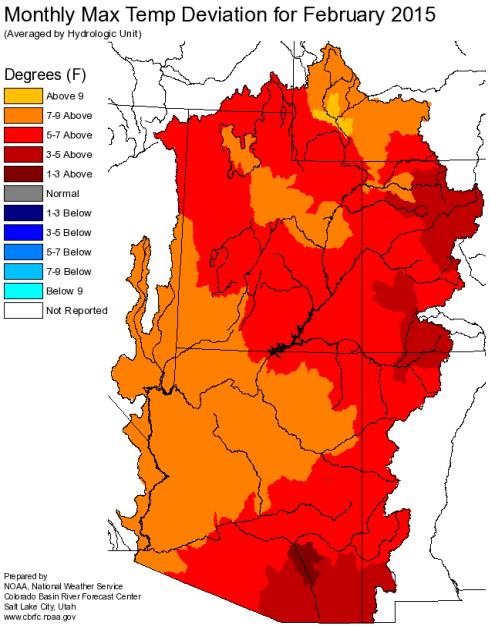
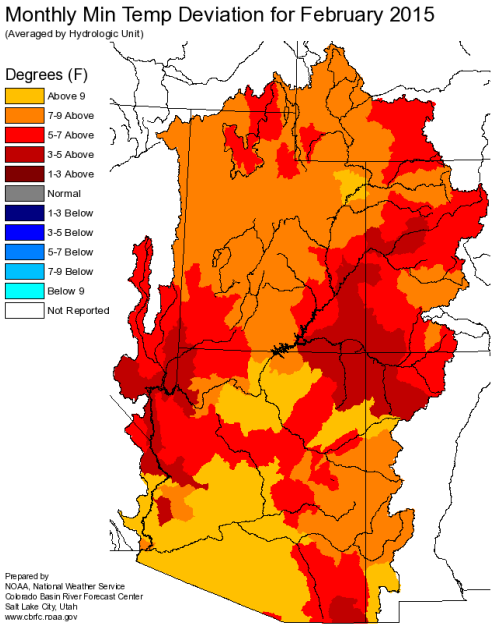
Maximum and minimum temperatures were much above average for February. This was the warmest February on record in some locations. Several areas observed average monthly maximum and minimum temperatures nearly 10 degrees above average. Several daily temperatures were established for both high maximum and high minimum readings. Snow melt occurred during February as well, even up to elevations of 9000 feet.

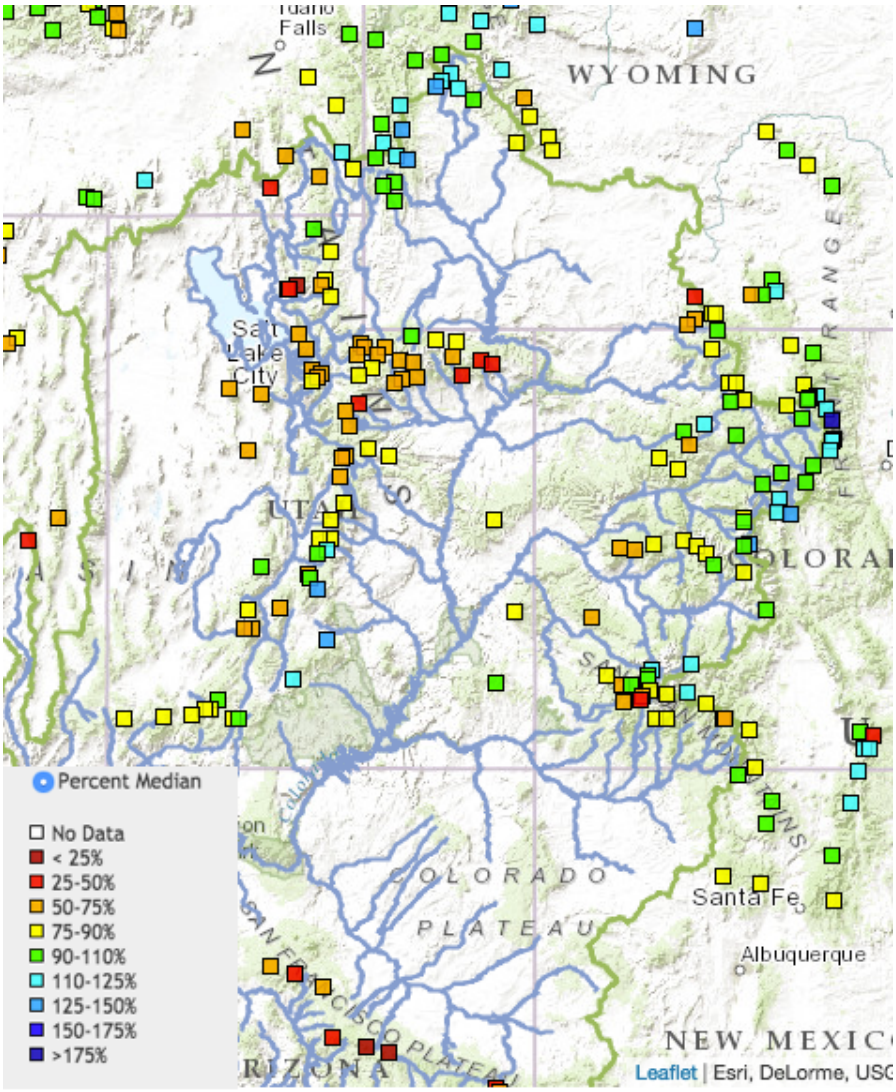



Monthly maximum and minimum temperature departure from average.

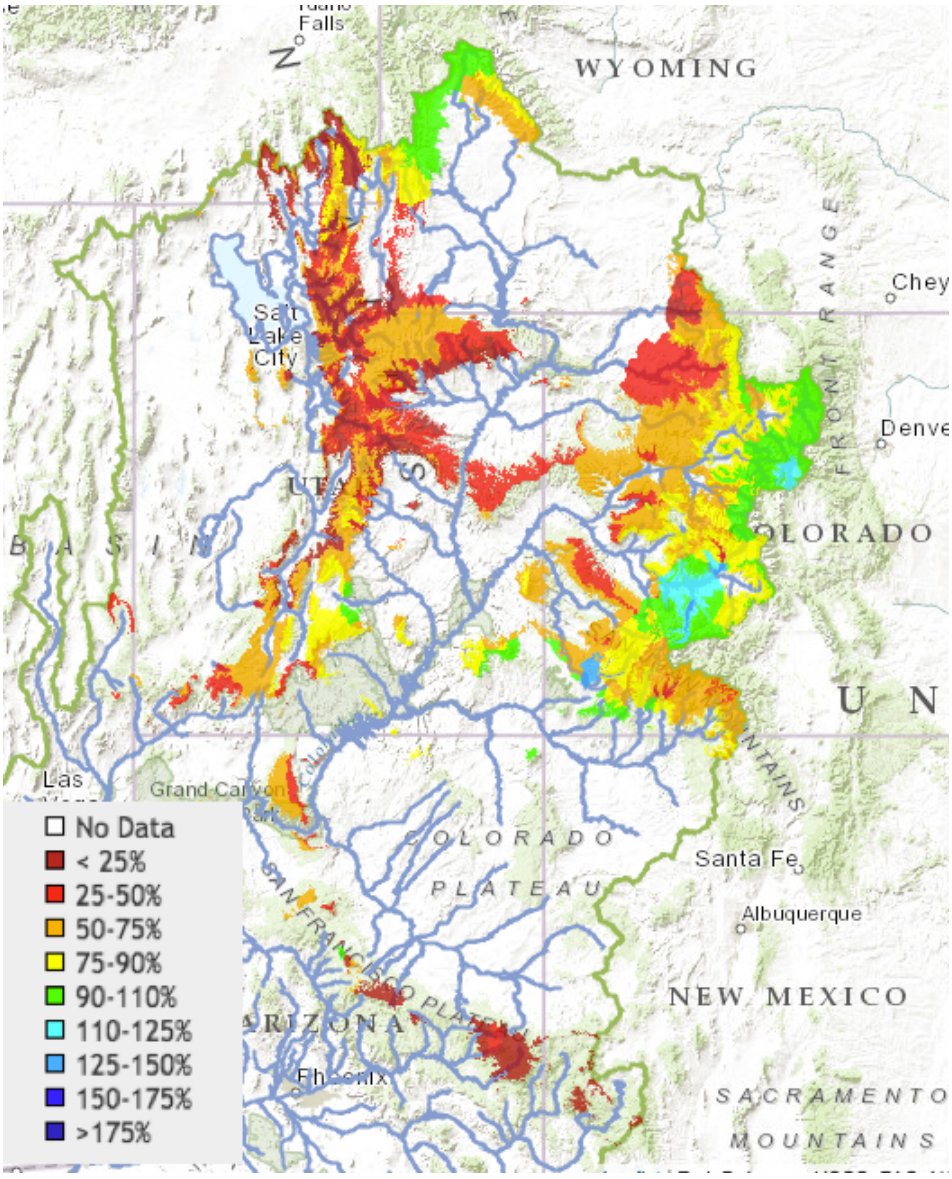
**Snowpack:**
There was slight improvement in snowpack conditions in parts of the San Juan and Virgin River Basin due to a storm at the end of the month; however, early March conditions remain well below the historical median. Snowpack conditions worsened in much of the Great Basin of Utah extending into the Duchesne River Basin with many SNOTEL sites falling well below typical conditions for early March. Near or above median snowpack persists in the Green River Basin above Fontenelle and Colorado River headwaters. Higher elevations in the southeast Gunnison River Basin have also jumped to above median. The snowpack varies significantly throughout the Upper Colorado and Green River Basins with numerous sites below average. Even within individual basins there is variation when comparing both elevation and aspect. Much of this can be explained due to the warm and mostly dry weather pattern that started last fall. Rain falling during typical snow accumulation periods, dry weather, and occasional melting snow have combined to create varying snow conditions within individual river basins.

The map below shows conditions of SNOTEL sites across the CBRFC area as of March 3, 2015. For more details and daily updates, please refer here.



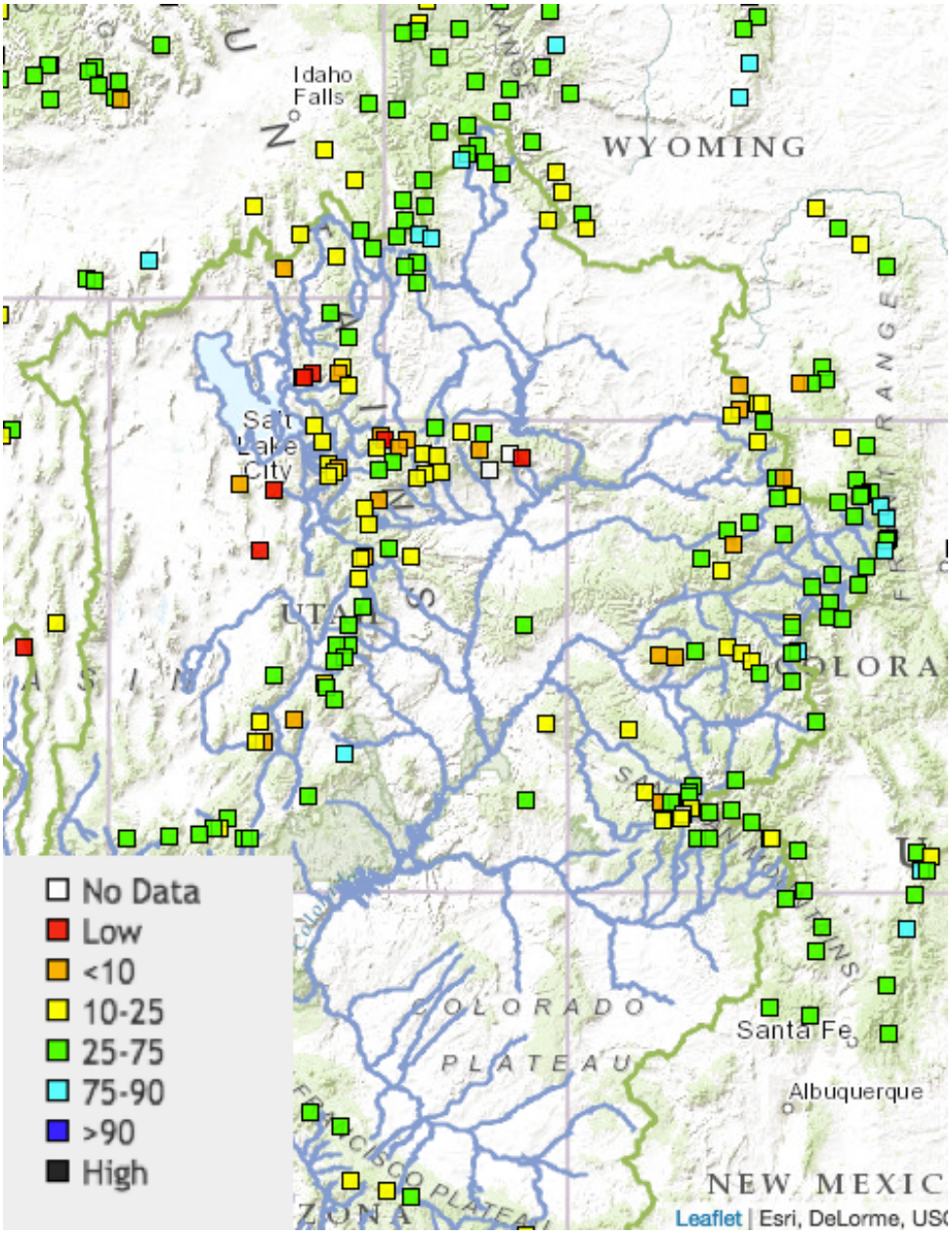
Percent median snow conditions as of March 3, 2015

The snowpack as viewed by the hydrologic model on March 3rd is shown below. The snow is represented as a mean areal value and displayed as a percent of average.  Updated versions of this map are also available here by selecting the “Grids" tab in the Snow Conditions menu.




Model Percent of Average Snow as of March 3 2015

The snow percentile map displayed below indicates where the current snow measurement ranks in the historical record for each site. Sites in red are at their lowest in over 30 years of record as of March 3, 2015. Those sites indicated with orange in the Great Basin and Duchesne River Basin rank as the 2nd, 3rd, or 4th driest in their period of record (typically between 30-37 years).




Snow Percentile Map: Historical ranking as of March 3, 2015

**Streamflow:**

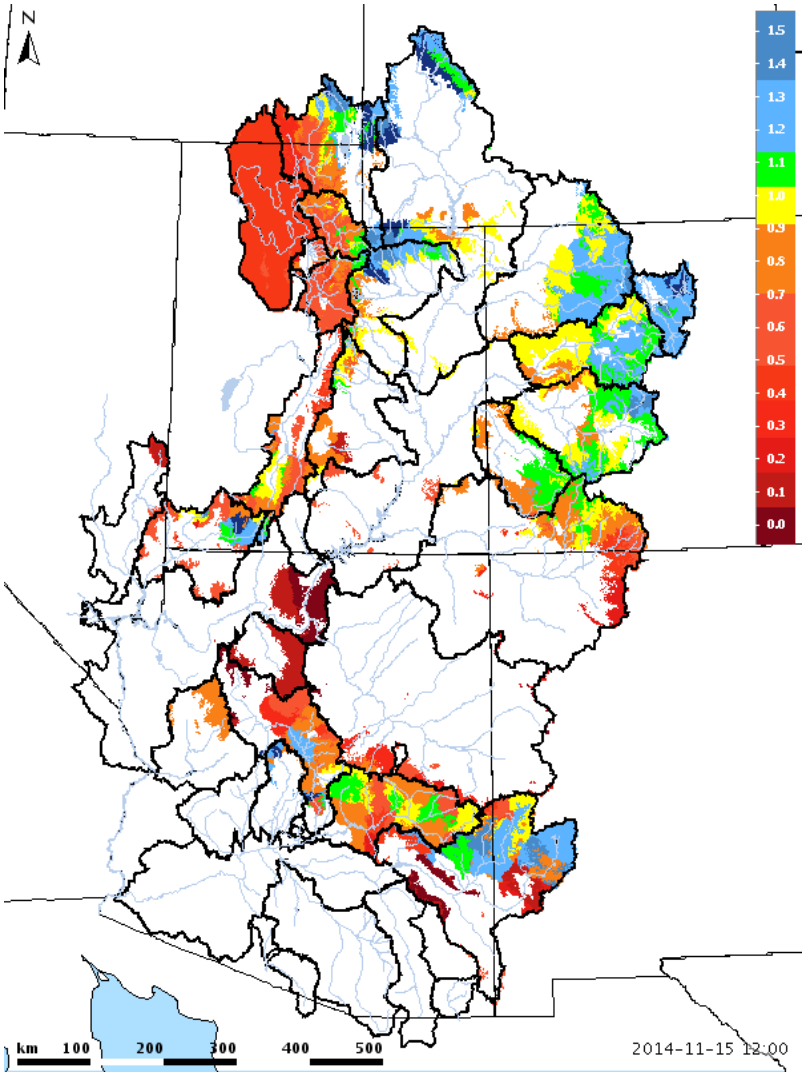
Streamflow is not something usually mentioned in the March discussion. Typically most stream gages are frozen during the month of February and active snow melt is weeks away. However, due to record warm temperatures throughout the winter, more stream gages have been ice free and reporting. While some areas have maintained above average streamflow throughout the winter due in part to August and September precipitation, other areas have had streamflow accentuated by snow melt. Keeping in mind streamflow averages for February are generally low, the inflow into Fontenelle reservoir was near 165 percent of average and the highest on record for February. The Upper Green River Basin in general was near 140 percent of average. In the Great Basin streamflow increased to above average levels in February with the Provo River Basin headwaters near 120 percent of average. Streamflow also

increased in the San Juan Basin over the previous month due to snow melt and rainfall.

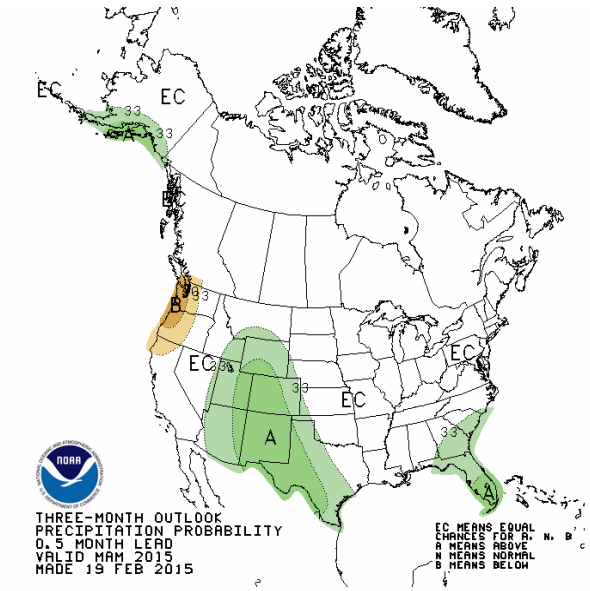
**Soil Moisture:**
Soil moisture conditions in the higher elevation headwater areas are important entering the winter, prior to snowfall, as it influences the efficiency of the snowmelt runoff the following spring. Modeled soil moisture conditions as of November 15th were above average over much of the Green River Basin above Fontenelle, headwaters of the Yampa and White River Basins, and the Colorado River headwaters above Kremmling. Above average soil moisture also existed over much of the Uinta Mountain range that drains into the Bear River, Duchesne River, and Green River above Flaming Gorge.

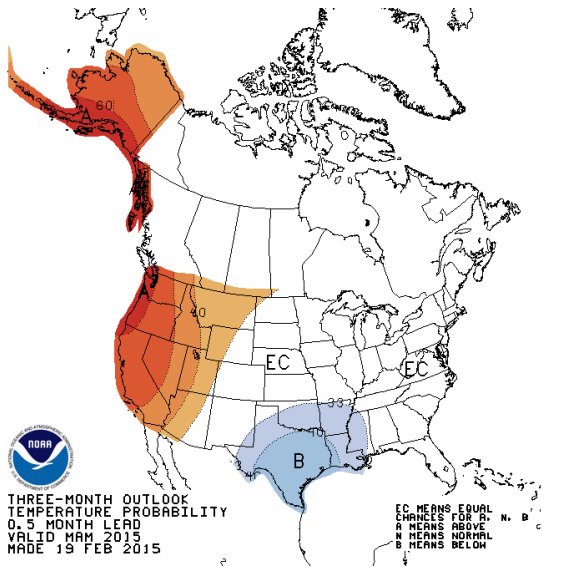
Soil moisture conditions were below average over the lower Bear River, Weber River, Provo River, and Six Creeks Basins. The Sevier River, San Juan River, and most of the Virgin River also had below average soil moisture conditions entering the winter. In Arizona, conditions varied but most areas were below average.

In the map below areas in blue are above the historical model soil moisture average while those in the red and orange are below average. Only the higher elevation areas are displayed. The areas in white are not included because they contribute very little to the runoff volumes.



**Climate Outlook:**
The El Niño Southern Oscillation (ENSO) condition continues to be neutral. However, positive sea surface temperatures anomalies exist across the central and eastern Pacific Ocean. Climate models indicate a 50%-60% chance that weak El Niño conditions will develop over the next couple of months. ENSO neutral conditions are favored for late spring with El Niño conditions once again favored throughout the remainder of 2015. The Climate Prediction Center indicates enhanced chances of above normal precipitation over all of the CBRFC forecast area during the March-May period. There is an enhanced chance of above normal temperatures over the eastern Great Basin and much of the Green River Basin with equal chances of above or below normal temperatures elsewhere during the March-April period.




**Conclusion:**

Dry conditions and record warm temperatures were the dominant weather pattern in February. Some storms moving around the high pressure ridge impacted higher elevations in the Colorado River headwaters during February. A strong storm system at the end of the month impacted parts of the Lower Colorado River Basin and southwest Colorado. With the exception of the Green River Basin above Fontenelle Reservoir and the Colorado River headwaters, snow conditions are generally below or much below their historical median for this time of year. Snow conditions improved slightly in southwest Utah and southwest Colorado while conditions worsened throughout much of the eastern Great Basin and Duchesne River Basin.

Highest runoff volumes as a percent of average are forecast in the Green River Basin above Fontenelle, Colorado River headwaters above Kremmling, and southeast Gunnison River Basin. Below average soil moisture and below average snow have combined for the lowest runoff volumes in parts of the San Juan Basin, Virgin River Basin, and Great Basin of northern Utah.

In the Lower Colorado River Basin near or above median March-May volumes are anticipated in the Verde River Basin. Below to much below median runoff volumes are forecast in the Salt, Little Colorado, and Gila River Basins. Rainfall in January in the Gila River Basin and recent rainfall in the Verde River Basin have increased forecasts for the full January-May period to near or above median.

**End Of Month Reservoir Content Tables**

- Green River Basin
- Upper Colorado River Basin
- San Juan River Basin
- Great Salt Lake Basin
- Sevier Basin

**Basin Conditions and Summary Graphics**

- Green River Basin
- Upper Colorado River Basin
- San Juan River Basin
- Great Salt Lake Basin
- Sevier River Basin
- Virgin River Basin